



March 10, 2015

8115-2010-32640-02

Aaron White
Exploitation Engineer
Murphy Oil Company Ltd.
4000, 520 – 3rd Avenue SW
Calgary AB T2P 0R3

Dear Mr. White:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT
MURPHY SUNDOWN D16-01-78-18; (WA #26366)
SUNDOWN FIELD – PADDY-CADOTTE FORMATION**

Oil and Gas Commission staff have reviewed your application, dated January 20, 2015, requesting approval to dispose of produced water into the Paddy formation of the subject well. This vertical well was purpose drilled for disposal to a total depth of 1,145 mKB in May of 2010. In August of 2013, the Paddy formation was perforated and tested for reservoir pressure, formation breakdown pressure, cement integrity and injectivity. Due to skin damage on the well, two acidize operations were conducted with the result of improved injectivity.

The OGC has created a compound Paddy-Cadotte formation designation in recognition that these formations are geologically unsegregated in this area, providing aggregate disposal capacity.

Attached please find Order 15-02-004, designating an area in the Sundown field – Paddy-Cadotte formation as a Special Project under section 75 of the *Oil and Gas Activities Act*, for the operation and use of a storage reservoir for the disposal of produced water. This Order includes a number of detailed operational conditions including: continuous tubing and casing pressure measurements, a maximum wellhead injection pressure, an ultimate reservoir pressure limit, as well as wellbore integrity monitoring and reporting requirements. Disposal wells are subject to regular field inspection and audit. Contravention of a condition of this Order may be subject to enforcement under section 62 of OGAA, or suspension or cancellation of the Order under section 75(2)(b).

The Commission advises that disposal well permit holders monitor seismic events in proximity to the well and be prepared to modify operations to mitigate induced seismicity. Permit holders may monitor seismic events through the Natural Resources Canada seismic monitoring network at <http://www.earthquakescanada.nrcan.gc.ca/recent/index-eng.php>

Monthly reporting requirement instructions are posted at <http://www.bcogc.ca/node/11152/download>. Additional general information regarding disposal wells is available on the Commission's website at <http://www.bcogc.ca/industry-zone/documentation/Subsurface-Disposal>.

Should you have any questions, please contact Michelle Gaucher at (250) 419-4482 or Ron Stefik at (250) 419-4430.

Sincerely,

Ron Stefik, Eng. L.
Supervisor, Reservoir Engineering
Oil and Gas Commission

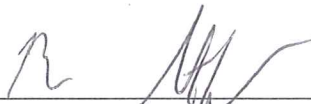
Attachment

ORDER 15-02-004

- 1 Under Section 75(1)(d) of the *Oil and Gas Activities Act*, the Commission designates the operation and use of a storage reservoir for disposal of produced water into the Paddy-Cadotte formation – Blueberry field as a special project in the following area:

DLS Twp 78 Rge 18 W6M Sec 1 Lsd 09, 10, 15, 16

- 2 Under section 75(2) of the *Oil and Gas Activities Act*, the special project designation in this Order is subject to the following conditions. The Permit Holder shall:
- a) Inject produced water, including well flowback completion fluids only, into the well Murphy Sundown D16-01-078-18W6M; WA26366 – Paddy-Cadotte formation (1012.0 to 1042.0 mKB MD).
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 12,300 kPag or the pressure required to fracture the formation, whichever is lesser.
 - c) Inject only through tubing with a packer set as near as is practical above the injection interval.
 - d) Continually measure and record the wellhead casing and tubing pressures electronically.
 - e) Cease injection and notify the Commission immediately if hydraulic isolation is lost in the wellbore or formation.
 - f) Submit the annual packer isolation test report to the Commission within 30 days of the completion of the test.
 - g) Include the disposal operating hours and the maximum injection pressure value on the monthly BC-S18 disposal statement.
 - h) Conduct a reservoir pressure test on the formation in the subject well annually, with a shut-in period of sufficient length to provide data for calculation of the reservoir pressure, and submit a report of the test within 60 days of the end of the test.
 - i) Cease injection upon reaching a maximum formation pressure of 7,400 kPaa.
 - j) i) Perform a casing inspection log on the subject well and submit results to the Commission within 30 days of the completion of logging, at an interval of not more than every 10 years, commencing from the date of initial injection.
ii) Perform a hydraulic isolation temperature log on the subject well and submit results to the Commission within 30 days of the completion of logging, at an interval of not more than every 5 years, commencing from the date of initial injection.
 - k) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.



Ron Stefik, Eng.L.
Supervisor, Reservoir Engineering
Oil and Gas Commission

DATED AT the City of Victoria, in the Province of British Columbia, this 10th day of March, 2015.

Advisory Guidance for Order 15-02-004

- I. A production packer must be set above the injection interval and the space between the tubing and casing filled with corrosion inhibiting fluids, as per section 16(2) of the Drilling and Production Regulation.
- II. Annual packer isolation tests are required, as per section 16(3) of the Drilling and Production Regulation.
- III. Injected fluids must be metered, as per section 74 of the Drilling and Production Regulation.
- IV. A monthly disposal statement must be submitted to the Commission not later than the 25th day of the month following the reported month, as per section 75 of the Drilling and Production Regulation.